FEDERAL DEFENDANTS' DECLARATION OF BRUCE P. STRAUSS

ATTACHMENT 3

Wagner v. U.S. Dep't of Energy

Civil No. 08-00136-HG-KSC (D. Haw.)

U.S. Department of Energy
and the
National Science Foundation

Memorandum of Understanding

between

the U.S. Department of Energy

and

the U.S. National Science Foundation

concerning

U.S. Participation in the Large Hadron Collider Program

December, 1999

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(This version supersedes the June, 1998 document.)

1. Introduction

The European Organization for Nuclear Research, CERN, in collaboration with the U.S. and other non-Member States, has undertaken construction of a new high energy physics research facility, the Large Hadron Collider (LHC), at its laboratory site outside Geneva, Switzerland. This facility, scheduled for completion in 2005, will include the LHC accelerator and two very large, general purpose detectors, ATLAS (A Toroidal LHC ApparatuS) and CMS (Compact Muon Solenoid). The accelerator is designed to collide two counter rotating proton beams, at a center-of-mass collision energy of 14 TeV, the highest in the world. The products of the collisions will be detected and recorded by ATLAS and CMS, which are being built by large international collaborations of universities and laboratories, including many in the U.S. CERN has responsibility for the construction and operation of the LHC accelerator. In addition CERN is contributing to the construction of, and is providing coordination and administrative support for, the ATLAS and CMS detectors and their research programs.

U.S. participation in the construction of the LHC accelerator and in the design and fabrication of the ATLAS and CMS detectors is hereinafter referred to as the U.S. LHC Construction Project. U.S. participation in the operation of the detectors and in the scientific program following completion of the facility and commissioning of the detectors is hereinafter referred to as the U.S. LHC Research Program.

2. Purpose of the Memorandum of Understanding

It is the purpose of this DOE/NSF Memorandum of Understanding (MoU) to define the relationship between the two agencies relative to the LHC Program, which comprises the programmatic coordination of U.S. participation in LHC Activities. The U.S. participation includes both the U.S. LHC Construction Project and the U.S. LHC Research Program[1].

[1] See **Glossary** for definition of these terms.

3. The U.S.-CERN LHC Agreement and Protocols

DOE and NSF responsibilities for the U.S. involvement in the LHC Program are set forth in three documents. The International Co-operation Agreement Concerning Scientific and Technical Co-operation on Large Hadron Collider Activities of December 8, 1997, hereinafter called the International Agreement, defines the U.S. responsibilities common to all parts of the LHC Program. The Experiments Protocol Concerning Scientific and Technical Cooperation on the Large Hadron Collider ATLAS and CMS Detectors of December 19, 1997, hereinafter called the Experiments Protocol, describes DOE and NSF responsibilities for the detectors. Finally, only DOE has responsibilities for U.S. participation in the LHC accelerator construction, and these are set forth in the Accelerator Protocol of December 19, 1997, hereinafter called the Accelerator Protocol. Copies of these three documents are attached as appendices A, B, and C, respectively.

3.1 Responsibilities

In accordance with the Agreement, DOE is solely responsible for providing funding of $200 million for goods and services for the LHC accelerator construction. In addition, DOE and NSF are responsible for providing funding of $250 million and $81 million, respectively, for goods and services toward the fabrication of the ATLAS and CMS detectors. The total funding for the U.S. LHC Construction Project is $531M. The DOE contribution of $450 million is budgeted from FY 1996 through FY 2004, and the NSF contribution of $81 million is budgeted from FY 1999 through FY 2003.

In accordance with the Experiments Protocol, the sum of $331 million that DOE and NSF are to provide during the ATLAS and CMS construction is to be divided approximately equally between the two detector projects, with each agency responsible for its own funding commitments. The responsibilities of DOE- and NSF-supported institutions to the ATLAS and CMS international collaborations for the construction of these detectors are specified in the MoU with CERN for each collaboration that is signed by the authorized representatives of the participating institutions.

Each MoU describes the organizational, managerial, and financial guidelines of the collaboration, including the tasks, costs, schedules, and other responsibilities of all participating institutions, both foreign and domestic.

In accordance with the Accelerator Protocol, DOE is solely responsible for providing an estimated $110 million worth of goods and services for the LHC accelerator from DOE national laboratories. DOE is also to provide approximately $90 million to be used for accelerator related procurements by CERN from U.S. industrial firms. These goods, services and procurements have been agreed upon by CERN and the DOE. An Implementing Arrangement between CERN and the participating DOE national laboratories sets forth the technical responsibilities of CERN and the DOE national laboratories to the LHC accelerator construction.

The U.S. LHC Research Program consists of those activities and functions required for the active participation of the U.S. scientific community in the physics research to be carried out with the ATLAS and CMS detectors, as foreseen by the International Agreement. Customary base program support of university groups is not included in the Research Program. The activities and functions included in the Research Program are preparation for operation of the detectors, development of the software required for data analysis, maintenance and operation of the detectors, analysis of the data, publication of the physics results from the experiments, and related activities. The U.S. LHC Research Program will require additional resources for the laboratories and universities, analogous to the pre-operational and operational phases of a new research facility. These resources are complementary to the funding provided in Article VIII of the International Agreement. The DOE and NSF will consult with the U.S. ATLAS and U.S. CMS Collaborations to develop a long-range funding profile and mechanisms for implementing the Research Program. Within the U.S. LHC Research Program, the DOE will have primary responsibility for funding new activities based in the national laboratories, notably the regional centers for computing located at the two Host Laboratories. Beyond their traditional program support of the activities at U.S. universities, DOE and NSF will be jointly responsible for funding

common projects such as CERN-based support activities, software development, and new University-based computing initiatives**.**

3.2 Relationships with CERN

In accordance with the International Agreement, the U.S. is represented in key management bodies at CERN. Specifically, the United States, through DOE and NSF, has observer status at the CERN Council, the governing body of CERN. Further, DOE and NSF are to participate in those closed sessions of the CERN Council, that is, the Committee of Council, where major LHC policy issues are discussed. These meetings are to be held at least once each year. NSF and DOE will consult periodically about U.S. representation.

A U.S.-CERN Co-operation Committee, established by the International Agreement, provides a mechanism for resolving bilateral issues between the DOE/NSF and CERN, with particular emphasis on matters related to areas of involvement of U.S. contractors and grantees. Representatives from the U.S. and CERN co-chair the Committee, which meets at least once each year. The Associate Director, DOE Office of High Energy and Nuclear Physics, is the U.S. Chair of the committee. The Committee also includes a representative of the NSF.

The Experiments Protocol provides that DOE and NSF representatives are full members of the ATLAS and CMS Resource Review Boards, which oversee resource-related matters for the detectors.

The Accelerator Protocol provides for DOE representation on the LHC Board. This board coordinates work on the LHC accelerator by CERN and non-Member States.

4. Authorities

The DOE is acting pursuant to authorities conferred in the Department of Energy Organization Act, 42 U.S.C. §7101, et seq., (42 U.S.C. § 7151), the Atomic Energy Act of 1954, 42 U.S.C. §2011 et seq., including, but not limited to, 42 U.S.C. §2051.

The NSF is acting pursuant to the National Science Foundation Act of 1950 as amended, and 42 U.S.C. §1861 et seq.

These authorizations for the two agencies, together with the internal policies and procedures of each agency, define the authority of the two agencies to establish and manage their respective programs in high energy particle physics. The DOE and NSF have signed the International Agreement, the Experiments Protocol, and the Accelerator Protocol within this context.

The program offices charged with responsibility for the U.S. LHC Program are the Division of High Energy Physics within the DOE Office of Science and the Division of Physics within the NSF Directorate of Mathematical and Physical Sciences. The authorities that the two program divisions bring to the joint management of the U.S. LHC Program are exactly those which they have independently as program offices within their respective agencies. In exercising their authority for joint oversight, management, and coordination of U.S. LHC collaborative activities, the two divisions will act as a single entity. In the implementation of the resultant joint actions and decisions, each will follow the policies and procedures of their respective agencies, particularly in the matters of contracting or of establishing grants with U.S. institutions, and in the subsequent management and funding of those contracts and grants.

5. Joint Oversight

The DOE and NSF have agreed to establish a Joint Oversight Group (JOG) as the highest level of joint U.S. LHC Program management oversight. The JOG has the responsibility to see that the U.S. LHC Program is effectively managed and executed so as to meet the commitments made to CERN under the International Agreement and its Protocols. The JOG provides programmatic guidance and direction for the U.S. LHC Construction Project and the U.S. LHC Research Program and coordinates DOE and NSF policy and procedures with respect to both. The JOGapproves and oversees implementation of the U.S. LHC Project Execution Plan (PEP) and the individual Project Management Plans (PMP) which are incorporated into the PEP. (See Section 6.)

The specific responsibilities of the JOG include:

- approval of the initial scope, cost and schedule baselines, and subsequent changes to the baselines at Level 1 of the Work Breakdown Structures (WBS) for U.S. LHC Projects;
- approval of the PEP and the attendant project management plans and any modifications

thereto;

- formal concurrence on the assignment of DOE and NSF employees to the positions of U.S. LHC Program Manager, Associate U.S. LHC Program Manager, and U.S. LHC Project Manager;
- formal concurrence on the assignments of designated university staff or DOE national laboratory staff as managers of U.S. LHC Projects;
- ensuring that technical, cost, schedule, and management reviews are conducted in a timely and effective manner;
- reviewing U.S. LHC detector and accelerator plans, budgets, and status reports;
- reviewing the DOE and NSF funding plans to assess their impact on the optimal execution of the objectives of the U.S. LHC Program;
- monitoring developments in the LHC Program and its related activities at CERN;
- reporting to senior NSF and DOE officials on major developments in, and external events affecting, the U.S. LHC Program; and
- identifying and forwarding issues to the U.S. Co-Chair of the Co-operation Committee and to other DOE and NSF officials as appropriate.

In addition to the joint oversight functions described above, the JOG shall identify and resolve those issues that cannot be resolved at lower levels of the management structure. Those issues that cannot be resolved at the JOG level will be referred to individuals within the NSF and DOE as are appropriate to the issue at hand. The JOG shall also perform such other activities as it deems appropriate and within its programmatic responsibilities.

The JOG is co-chaired by the Director of the DOE Division of High Energy Physics and the Director of the NSF Division of Physics. They report, respectively, to the Associate Director for High Energy and Nuclear Physics at the DOE and the Assistant Director for Mathematical and Physical Sciences at NSF. Either Co-Chair may delegate authority within the agency. In the event of such delegation, the other Co-Chair shall be formally notified in writing.

Membership in the JOG is by mutual agreement of the Co-Chairs and shall be limited to Federal employees and Intergovernmental Personnel Act (IPA) appointees. While meetings of the JOG may be limited to the Co-Chairs, they will typically include the U.S. LHC Program Manager, the Associate U.S. LHC Program Manager, the U.S. LHC Project Manager, appropriate staff from DOE's Office of High Energy and Nuclear Physics and NSF's Division of Physics, and appropriate university and laboratory leadership involved in the execution of the U.S. LHC Program.

The JOG will meet at least semi-annually. In the event that the JOG cannot meet, the duties of the JOG can be discharged by the mutual agreement of both Co-Chairs. Those agenda items for JOG meetings that require separate agency review will be identified approximately one month prior to the JOG meeting date.

6. U.S. LHC Program – Day-to-Day Management

Program management activities are considered to be those which would normally be carried out by NSF and DOE program divisions separately in preparing and defending budget requests within the agencies, to the Executive Branch, and before the Congress; in the allocation of funds within the government, to universities or to national laboratories; and in oversight of the activities funded. Through implementation of this MoU, the NSF and DOE agree to coordinate their LHC related programmatic activities.

The U.S. LHC Construction Project consists of those day-to-day activities specifically required for the U.S. participating universities and national laboratories to execute the construction and delivery of the scientific and technical components ("deliverables") agreed to by the DOE, NSF, and CERN (See Protocols in Appendices B and C.). The U.S. LHC Research Program consists of those activities related to active participation in the operation of the detectors and subsequent

analysis and publication of the physics results from the experiments. Collectively, the U.S. LHC Construction Project and the U.S. LHC Research Program constitute the U.S. LHC Program. The NSF and DOE have chosen to treat these activities as a single overall program, subject to the normal review and oversight procedures of each agency for its respective components.

6.1 Management Structure

The lines of authority and responsibilities for the management of the U.S. LHC Projects are described in the U.S. LHC Project Execution Plan (PEP). The PEP covers the management structure from the JOG through all subsidiary programs and projects within U.S. LHC Accelerator, U.S. ATLAS, and U.S. CMS. The management of all projects within the U.S. LHC Construction Project and Research Program are described by appropriate Project Management Plans (PMP), which are incorporated as appendices to the PEP.

6.2 Program/Project Offices and Staffing

The U.S. LHC Program Office and the U.S. LHC Project Office are established to carry out the management functions set forth in the PEP. These offices are staffed by Federal employees or IPA appointees assigned by the DOE and NSF. As the DOE has been designated lead agency for the U.S. LHC Program, the U.S. LHC Program Manager and U.S. LHC Project Manager, who respectively head the program and project offices, will generally be DOE employees. The Associate U.S. LHC Program Manager will generally be an NSF employee.

The U.S. LHC Program Office has the overall responsibility for day-to-day program management of the U.S. LHC Program as described in the PEP. In this capacity, it reports directly to the JOG and acts as its executive arm. The office is jointly responsible with the U.S. LHC Project Office for preparation and maintenance of the PEP, and interfaces with the DOE Division of High Energy Physics and the NSF Division of Physics, which are the respective agency offices charged with responsibility to oversee the U.S. LHC Program. The Program Manager and Associate Program Manager are responsible for the coordination between the agencies of the joint oversight activities described in this MoU and the PEP. In particular, the Program Office will arrange for appropriate agency clearances of the PEP, PMPs, and other documents as may be required, as well as the accomplishment of project reviews as charged by

the JOG or as deemed necessary for effective program management. These reviews will be held at least annually.

The U.S. LHC Project Office is responsible for day-to-day oversight of the U.S. LHC Projects as described in the PEP. In this capacity, the U.S. LHC Project Manager reports to the U.S. LHC Program Manager, and routinely interfaces with the Project Managers for each of the U.S. LHC Projects. These managers represent the contractors and grantees to DOE and NSF. These contractors and grantees have direct responsibility to design, fabricate, and provide to CERN the goods and services agreed in the International Agreement and Protocols, and to fulfill the U.S. commitments in the LHC Research Program. The Project Office is responsible, in collaboration with the individual project managers, for preparing and maintaining the PMPs for each of the U.S. LHC Projects.

7. DOE-NSF Coordination

There are programmatic activities normally carried out independently by the NSF and DOE program offices that will be coordinated by the U.S. LHC Program Office so as to more effectively represent the U.S. LHC Program. They include:

- interactions with Congress in response to official inquiries, testimony, or discussion;
- initiatives in education of direct relevance to the U.S. participation on the LHC;
- public outreach activities focussed on U.S. participation in the LHC; and
- release of public information.

8. Approval, Amendments, and Terminations

This MoU is effective upon signature by both the Director, Office of Science, U.S. DOE, and the Assistant Director for Mathematical and Physical Sciences, NSF. It supersedes the MoU of June, 1998, and remains in effect for the term specified in the International Agreement.

This MoU may be amended by written agreement between DOE and NSF.

Either the DOE or the NSF may terminate this MoU by at least a ninety (90) day advanced written notice to the other, or by the agreement in writing of both parties.

Original signed 15th day of June 1998

Executed this 13th day of December, 1999

John R. O'Fallon
Director
Division of High Energy Physics
U.S. Department of Energy

John W. Lightbody, Jr.
Executive Officer
Division of Physics
U.S. National Science Foundation

Approved:

Martha A. Krebs
Director
Office of Science
U.S. Department of Energy

Robert A. Eisenstein
Assistant Director for
Mathematical and Physical Sciences
U.S. National Science Foundation

Glossary

ATLAS (A Toroidal LHC ApparatuS) - A general-purpose particle detector to be installed at Point 1 of the LHC ring. Distinctive features of ATLAS are a large volume, air-core toroidal magnet providing good momentum resolution and sign discrimination for muons and a fine-grained liquid argon electromagnetic calorimeter.

CERN (European Organization for Nuclear Research) - An intergovernmental organization established by Convention signed in Paris on 1 July 1953, revised on 17 January 1971. Also known as the European Organization for Particle Physics.

CERN Council - The governing body of CERN, made up of representatives of all Member States.

CERN-U.S. Co-operation Committee- A committee established by the International Co-operation Agreement of December 1997 between CERN and the DOE and NSF concerning Scientific and Technical Co-operation on Large Hadron Collider Activities. The charge to the Committee is to monitor and facilitate activities undertaken under the agreement, with particular emphasis on matters relating to areas of involvement of U.S. contractors and grantees. The CERN Co-Chair is the CERN Director General. The U.S. Co-Chair is the Associate Director for High Energy and Nuclear Physics of the Office of Science in the DOE. The NSF is represented on the Committee by the Assistant Director for Mathematical and Physical Sciences.

CMS (Compact Muon Solenoid) - A general purpose particle detector to be installed at Point 5 of the LHC ring. A distinctive feature of CMS is a high field solenoid surrounding a precision tracker providing high precision spatial information for decay vertices and particle tracking.

Host Laboratory - A designated DOE laboratory that has management oversight responsibilities for U.S. LHC Accelerator, U.S. ATLAS, or U.S. CMS activities.

JOG (DOE/NSF Joint Oversight Group) - The combined DOE/NSF operating group for the U.S. LHC Program. The Director of the DOE Division of High Energy Physics and the Director of the NSF Division of Physics serve as co-chairs of the JOG.

LHC (Large Hadron Collider) - A particle accelerator at CERN that will collide two counter-rotating beams of protons, each with an energy of up to 7 trillion electron volts. The beams will collide at four intersection points at which appropriate particle detectors will be located. The accelerator will be fed by an existing cascade of lower-energy accelerators.

LHC Activities - The LHC project, the exploitation of the LHC accelerator and the LHC experiments and supporting research and development, and other LHC-related activities. International Agreement, Article I, 1.6)

LHC Program - The program for carrying out LHC Activities.

LHC Project - The activities by CERN to build the LHC accelerator and to contribute to the construction of, and to provide co-ordination and support for, the LHC experiments. (International Agreement, Article I, 1.5)

RRB (Resource Review Board) - An oversight board, with representatives of the concerned funding agencies and the CERN management, for each of the LHC detectors, ATLAS, CMS, which reviews and allocates resources required for the project to proceed on cost and schedule. The Co-Chairs of the U.S. DOE/NSF JOG are ex-officio members of the RRB.

U.S. LHC Construction Project - U.S. participation in the construction of the LHC accelerator and in the design and fabrication of the ATLAS and CMS detectors. Funding in the amount of $450M has been provided in the DOE budget plan and $81M in the NSF budget plan. Details of the U.S. "deliverables" are found in the respective Project Management Plans.

U.S. LHC Operations and Maintenance Project - U.S. participation in the acquisition of data during LHC operations and maintenance of the LHC detectors following commissioning. The Project is an element of the U.S. LHC Research Program. It has two components, U.S. ATLAS and U.S. CMS.

U.S. LHC Program - U.S. participation in construction of the LHC Accelerator and construction and operation at CERN of the ATLAS and CMS detectors. The U.S. LHC Program has two components, the U.S. LHC Construction Project and the U.S. LHC Research Program.

U.S. LHC Projects - The U.S. LHC Construction Project and the U.S. LHC Research Program are comprised by a number of well-defined sub-projects, e.g., U.S. LHC Accelerator, is under the U.S. LHC Construction Project. The collection of these sub-projects is referred to collectively as U.S. LHC Projects.

U.S. LHC Research Program - U.S. participation in the operation of the LHC detectors and in the physics investigations enabled by the detectors, following completion of the facility and commissioning of the detectors.

U.S. LHC Software and Computing Project - Development and operation of the computing and networking facilities and development of the software required for effective U.S. participation in the LHC Research Program. The Project is an element of the U.S. LHC Research Program. It has two components, U.S. ATLAS and U.S. CMS.

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Appendices

Appendix A: The International Cooperation Agreement

Appendix B: The Accelerator Protocol

Appendix C: The Detector Protocol